510(k) SUBSTANTIAL EQUIVALENCE DETERMINATION
DECISION SUMMARY
DEVICE ONLY TEMPLATE

A. 510(k) Number: K031512

B. Analyte: cocaine metabolite

C. Type of Test: qualitative or quantitative homogeneous enzyme immunoassay

D. Applicant: Syva Company, Dade Behring Inc.

E. Proprietary and Established Names: EMIT II Plus Cocaine Metabolite Assay

F. Regulatory Information:

1. Regulation section: 21CFR862.3250, Cocaine and Cocaine Metabolite Test System.

2. Classification: Class II

3. Product Code: DIO

4. Panel: Toxicology (91)

G. Intended Use:

1. Indication(s) for use: The EMIT II Plus Cocaine Metabolite Assay is a homogeneous enzyme immunoassay with a 150 ng/ml or 300 ng/ml cutoff . The assay is intended for use in the qualitative and semi-quantitative analyses of benzylecgonine (cocaine metabolite) in human urine. EMIT II Plus Assays are designed for use with a number of chemistry analyzers.

2. Special condition for use statement(s): The EMIT II Plus Cocaine metabolite Assay provides only a preliminary analytical test result. A more specific alternative chemical method must be used to obtain a confirmed analytical result. Gas chromatography/Mass spectrometry is the preferred confirmatory method. Other chemical confirmation methods are available. Clinical consideration and professional judgement should be applied to any drug of abuse test result, particularly when preliminary positive results are used.

For prescription use.

3. Special instrument Requirements: The device is for use on automated clinical chemistry analyzers.

H. Device Description:

The device consists of two reagent sets (Reagents 1 and 2) containing all components of the immunoassay (antibodies, substrates, enzyme-labeled benzylecgonine and inactive components).

I. Substantial Equivalence Information:

1. Predicate device name(s): Syva EMIT II Plus Cocaine Metabolite Assay

2. Predicate K number(s): K993988

3. Comparison with predicate: Indications for use, operating principle and reagent composition are similar to the predicate device. The change to the device includes updated (more stringent) performance claims for correct identification of near-cutoff samples.

J. Standard/Guidance Document Referenced (if applicable):

K. Test Principle: The test is a homogeneous enzyme immunoassay for use on automated clinical chemistry analyzers.

L. Performance Characteristics (if/when applicable):

Performance was evaluated on the Syva 30R Biochemical System.

1. Analytical performance:

a. Precision/Reproducibility: Precision was determined by assaying calibrators and in-house control material for 20 days, 2 runs per day in triplicate. Calculations were according to NCCLS EP5-A.

Qualitative Analysis

Concentration (ng/ml)	Mean (mAU/ min)	Within-run precision		Total precision	
		standard deviation	%CV	standard deviation	%CV
0	251.4	1.5	0.6	1.7	0.7
113	286.1	1.8	0.6	2.0	0.7
150	305.0	2.0	0.7	2.3	0.8
188	322.6	2.3	0.7	2.5	0.8
375	377.6	2.1	0.6	2.6	0.7

Semi-Quantitative Analysis

Concentration (ng/ml)	Mean (ng/mL)	Within-run precision		Total precision	
		standard deviation	%CV	standard deviation	%CV
113	98.4	4.1	4.2	4.4	4.5
150	141.1	4.6	3.3	5.4	3.8
188	183.7	5.8	3.2	6.3	3.4
225	217.5	6.2	2.9	6.8	3.1
300	302.4	8.3	2.7	9.6	3.2
375	372.6	10.2	2.7	12.5	3.4

b. Linearity/assay reportable range:
Recovery was determined by spiking negative human urine with known concentrations of benzylecgonine throughout the range 45 ng/ml to 900 ng/ml. Samples at each concentration level were analyzed in replicates of 20. The averaged recoveries of these replicate determinations ranged from 95-112%.

Semiquantitation of positive results enables the laboratory to determine an appropriate dilution of the specimen for confirmation by GC/MS. The semiquantitative mode also permits the laboratory to establish quality control procedures and assess control performance.

c. Traceability (controls, calibrators, or method): EMIT calibrators and commercial control materials are required but not supplied.

d. Detection limit: Sensitivity was determined by assaying the negative calibrator in duplicate for ten runs and determining a standard curve. The analytical sensitivity (mean plus two standard deviations) is less than 35 ng/ml.

e. Analytical specificity: Cross-reactivity was tested by spiking four levels of cocaine and ecgonine. The best line of the nominal value versus the semi-quantitative response was determined. The process was performed across multiple calibrators, lots and instruments. The following concentrations produce responses approximately equivalent to benzylecgonine at the cutoff concentrations.

Compound	Concentration (ug/ml) at the 150 ng/ml cutoff	Concentration (ug/ml) at the 300 ng/ml cutoff
Cocaine	18-53	40-119
ecgonine	2-6	7-20

A variety of over-the-counter and prescription drugs were tested for interference by spiking into negative urine. The drugs and levels in the samples tested are listed in the package insert. No unusual interference was observed from these tests.

f. Assay cut-off: Assay cutoffs are 150 or 300 ng/ml. (See precision/reproducibility section above).

2. Comparison studies:

a. Method comparison with predicate device:

Comparison to GCMS was evaluated at the manufacturer's site for 125 urine samples (120 native retrospective samples and 5 diluted samples). Sample concentrations ranged from 60 to greater than 1000 ng/ml and included at least 11 samples within +25% and 11 samples within -25% of the two cutoff concentrations. Results of the 150 ng/ml and 300 ng/ml cutoffs for the EMIT qualitative assay and GCMS are shown:

Method Comparison Tables
150 ng/ml cutoff, qualitative:

		GCMS +	GCMS -
EMIT	+	62	2*
	-	7*	54

* 8 of these 9 results were near-cutoff samples (within +/-25% of the cutoff concentration) .

300 ng/ml cutoff, qualitative:

		GCMS +	GCMS -
EMIT	+	34	6*
	-	1*	84

* 6 of these 7 results were near-cutoff samples (within +/-25% of the cutoff concentration).

b. Matrix comparison: Not applicable. The device is indicated only for urine specimens.

3. Clinical studies:

a. Clinical sensitivity: Not applicable. Clinical studies are not typically submitted for this device type.

b. *Clinical specificity:* Not applicable. Clinical studies are not typically submitted for this device type.

c. *Other clinical supportive data (when a and b are not applicable):*

4. Clinical cut-off: Not applicable

5. Expected values/Reference range: Not applicable

M. Conclusion:

I recommend that the EMIT II Plus Cocaine Metabolite Assay is substantially equivalent to the predicate device.